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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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270 7590 09/29/2011
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EXAMINER

KIECHLE, CAITLIN ANNE

ART UNIT

PAPER NUMBER

1733

NOTIFICATION DATE

DELIVERY MODE

09/29/2011

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@howsonandhowson.com

Office Action Summary	Application No.	Applicant(s)	
	10/551,732	ODA ET AL.	
	Examiner	Art Unit	
	CAITLIN KIECHLE	1733	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 July 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 5) ☒ Claim(s) 1-3, 7, 8, 13-27 and 29-31 is/are pending in the application.
- 5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☒ Claim(s) 3, 7, 8, 13, 15-27, 29 and 30 is/are allowed.
- 7) ☒ Claim(s) 1, 2, 14 and 31 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☒ The drawing(s) filed on 03 October 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 19, 2011 has been entered.

Status of Claims

2. Claims 1 – 3, 7, 8, 13 – 27, and 29 – 31 are pending where claims 1 – 3, 7, 15 – 18, and 20 have been amended. Claims 4 – 6, 9 – 12, and 28 have been cancelled.

Status of Previous Rejections

3. The 35 U.S.C. 102(b) rejection of claims 1, 7, 17, 18, 20, and 31 as being anticipated by WO 00/31310 has been withdrawn in view of the amended claims filed July 19, 2011.

The 35 U.S.C. 103(a) rejection of claims 2, 14 – 16, and 19 as being unpatentable over WO 00/31310 has been partially withdrawn in view of the amended claims filed July 19, 2011.

Claim Interpretation

4. The claim 7, and 8 limitation of “a tantalum sputtering target having a non-recrystallized structure” is interpreted by the Examiner as a tantalum sputtering target having non-recrystallized structure present in the target, but not necessarily 100% non-

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recrystallized structure. The dependent claims 2 and 3 support this interpretation because they do not require 100% non-recrystallized structure.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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8. Claims 1, 2, 14, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/31310 (hereinafter WO '310).

With respect to amended claim 1, p. 4 line 22- p.5 line 7, p. 9 lines 4-22, and p. 10 line 14-p. 11 line 9 of WO '310 disclose a tantalum sputtering target manufactured by subjecting a molten and cast tantalum ingot to plastic working such as forging, annealing, and rolling, where at least about 80% of the tantalum metal is recrystallized. Therefore, the tantalum sputtering target of WO '310 has a maximum of 20% non-recrystallized structure which overlaps with the instant claimed range.

In regards to instant claim 2, p. 4 line 22- p.5 line 7 of WO '310 discloses a tantalum sputtering target where at least about 80% of the tantalum metal is recrystallized. Therefore, the tantalum sputtering target of WO '310 has a maximum of 20% non-recrystallized structure. Although a 20% non-recrystallized structure does not overlap with the claimed range of "more than 20%," it is very close in value and one of ordinary skill in the art would have expected them to have the same properties. A prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. See MPEP 2144.05.

Regarding instant claim 14, WO '310 does not specifically teach the Vickers hardness of the Ta sputtering target. However, one of ordinary skill in the art would have expected the Ta sputtering target of WO '310 to have a Vickers hardness similar to that of the instant invention because it has an overlapping composition and is made using a similar method. See MPEP 2112.

With respect to instant claim 31, p. 4 lines 12-26 of WO '310 disclose that the tantalum sputtering target is made of a high purity tantalum having a purity of 4N5 (99.995%) or more.

Allowable Subject Matter

9. Claims 3, 7, 8, 13, 15 – 27, 29, and 30 are allowed.
10. The following is an examiner's statement of reasons for allowance: in regards to independent claim 3, the closest prior art of WO '310 does not disclose a tantalum sputtering target where the non-recrystallized structure is 40% or more. It would not have been obvious to modify the prior art to achieve the claimed amount of non-recrystallized structure because the prior art teaches that at least about 80% of the tantalum metal is recrystallized which is much larger than the recrystallized structure of 60% or less in the instant claim 3. Claims 13, 15, and 16 are dependent on claim 3 and are therefore allowable for the same reasons as claim 3. Regarding independent claims 7 and 8, the closest prior art of WO '310 does not teach the method step of annealing the ingot or billet at a temperature of 1173 K or less to provide the Ta sputtering target with a non-recrystallized structure. Rather, the prior art of WO '310 teaches that the Ta sputtering target is annealed at a temperature of 950°C -1150°C (1223 K to 1423 K) which is much higher than the claimed annealing temperature range. Also, the claimed temperature of 1173 K is the recrystallization temperature of the Ta sputtering target and therefore the instant claims 7 and 8 require an annealing temperature that is at the recrystallization temperature or below. On the other hand, WO '310 requires an annealing temperature that is above the recrystallization temperature. Therefore, it

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would not have been obvious to one of ordinary skill in the art to anneal the Ta sputtering target of WO '310 within the instant claim 7 and 8 range because it is below the recrystallization temperature and WO '310 teaches that the target should be annealed at a temperature above the recrystallization temperature. Claims 17 – 20 are dependent on claim 7 and claims 21 – 27, 29, and 30 are dependent on claim 8 and are all therefore allowable for the same reasons as claims 7 and 8.

Response to Arguments

11. Applicant's arguments filed July 19, 2011 have been fully considered but they are not persuasive.

Arguments are summarized as follows:

a. Claim 1 is not obvious in view of WO '310 which discloses a “sputtering target” produced by forging a raw material to form a slab, annealing, rolling to form a plate, final annealing, and machining. WO '310 teaches to one of ordinary skill in the art that the sputtering target has “complete recrystallization.”

Accordingly, if one of ordinary skill in the art were to follow the teachings of WO '310 to produce a sputtering target, the end result would be a completely recrystallized structure and not a sputtering target having 20% or more of non-recrystallized structure as required by amended claim 1. WO '310 not only fails to disclose the limitations of claim 1 but also teaches away from the sputtering target of claim 1. Table 3 on pages 21 and 22 of WO '310 disclose annealed plates being 98% or 99% recrystallized. However, this far exceeds the

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requirements of amended claim 1 and clearly teaches that the target should be completely recrystallized thereby teaching away from claim 1.

b. In the previous Office Action, claim 18 of WO '310 is relied upon for teaching a sputtering target 80% recrystallized (and therefore 20% non-recrystallized). Applicants submit that claim 18 is being improperly interpreted and that WO '310 directs one of skill in the art to completely recrystallize the structure. All claims are read in light of the specification and the disclosure of WO '310 is that "final products" can be made from raw material and clearly states that "the present invention also relates to a high purity tantalum, e.g., suitable for use as a sputtering target having a *fully recrystallized* grain size." WO '310 clearly describes a high purity Ta metal raw material that is subjected to certain required processing to ultimately manufacture a sputtering target and that the target does not consist simply of the raw material high purity Ta metal without the required processing. Thus, only after the Ta metal is subjected to the process steps of WO '310, including final annealing, is a sputtering target created. The terse language of claim 18 of WO '310 does not alter this clear teaching to one of ordinary skill in the art provided by the specification of WO '310. The overly broad interpretation of WO '310 stated in the previous Office Action is not supported by the teachings of WO '310.

c. WO '310 states that "the high purity tantalum ingot can be thermomechanically processed to produce high purity tantalum containing product. The fine, and preferably fully recrystallized, grain structures and/or

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uniform texture are imparted into the product through a combination of cold and/or warm working and in-process annealing.” WO '310 specifically discusses the formation of a sputtering target by, for example, requiring cleaning of surfaces of the raw material high purity tantalum metal, flat forging into rolling slabs, annealing to achieve uniform recrystallization, rolling to form at least one plate, final annealing, cleaning, and machining into a sputtering target of desired dimensions. With respect to “final annealing,” WO '310 states that “with respect to annealing of the tantalum plate, preferably this annealing is in a vacuum annealing at a temperature for a time sufficient to achieve complete recrystallization of the tantalum metal.”

d. With respect to amended dependent claim 2, WO '310 certainly fails to disclose or make obvious a sputtering target having a structure more than 20% non-recrystallized.

Examiner's responses are as follows:

a. The Examiner maintains the position that claim 18 of WO '310 discloses a sputtering target (a final product of the invention) comprising a tantalum metal where the metal is at least partially recrystallized. This supports the Examiner's position in the above rejection and the previous Office action that WO '310 discloses a Ta sputtering target that is at least partially recrystallized, and more preferably at least about 80% recrystallized and even more preferably at least about 98% recrystallized and most preferably fully recrystallized as disclosed in p. 5 lines 4-7 of WO '310. It is clear from p. 5 lines 4-7 that the broadest teaching

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of WO '310 is that the sputtering target is at least partially recrystallized as further supported in claim 18 of WO '310. Therefore, although the preferred embodiment of WO '310 is that the Ta sputtering target is fully recrystallized, the prior art is not limited to the preferred embodiments and therefore it is still within the scope of WO '310 that the Ta sputtering target is at least partially recrystallized which means that the Ta sputtering target contains a portion that is non-recrystallized structure as recited in the instant claims. See MPEP 2123. WO '310 does not teach away from the sputtering target of claim 1, but rather teaches that full recrystallization is preferred, although not required. WO '310 does not clearly teach on p. 5 lines 4-7 that the tantalum metal discussed is a "raw material", as suggested by Applicant, and thus with the support of claim 18, the Examiner interprets that WO '310 teaches a tantalum sputtering target that is at least partially recrystallized. As further support for the Examiner's position, p. 5 lines 2-4 of WO '310 teaches that the tantalum metal has a grain size of about 150 μm or less and is the sentence before the recrystallization properties of the tantalum metal is discussed, which Applicant suggests is a "raw material." However, p. 10 lines 14-p. 11 line 9 of WO '310 discloses the method of making the sputtering target from the tantalum metal and clearly teaches that "the plate is then annealed a final time at a sufficient temperature and for a sufficient time to have an average grain size of equal to or less than about 150 microns." This would suggest to one of ordinary skill in the art that the grain size of 150 microns or less discussed on p. 5 of WO '310 in regards to the tantalum metal is not

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achieved until the tantalum metal has been processed. Therefore, the Examiner takes the position that the same holds true for the amount of recrystallization of the tantalum metal which is in the broadest sense, at least about 80% of the tantalum metal as relied on in the above rejection.

b. See response a.

c. WO '310 clearly states that the tantalum ingot is **preferably** fully recrystallized and therefore this is merely a preferred embodiment and a recrystallization of at least 80% is still within the scope of WO '310 as discussed in response a.

d. Amended claim 2 was addressed in the above rejection.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CAITLIN KIECHLE whose telephone number is (571)270-3589. The examiner can normally be reached on Monday - Friday 8:00 AM - 5:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ Roy King/
Supervisory Patent Examiner, Art
Unit 1733

CK